

# Valkyrie Simulation Data for Public Release

Jordan T. Lack  
Valkyrie Software and Controls Lead  
NASA/JSC  
[Jordan.t.lack@nasa.gov](mailto:Jordan.t.lack@nasa.gov)

9-8-2015

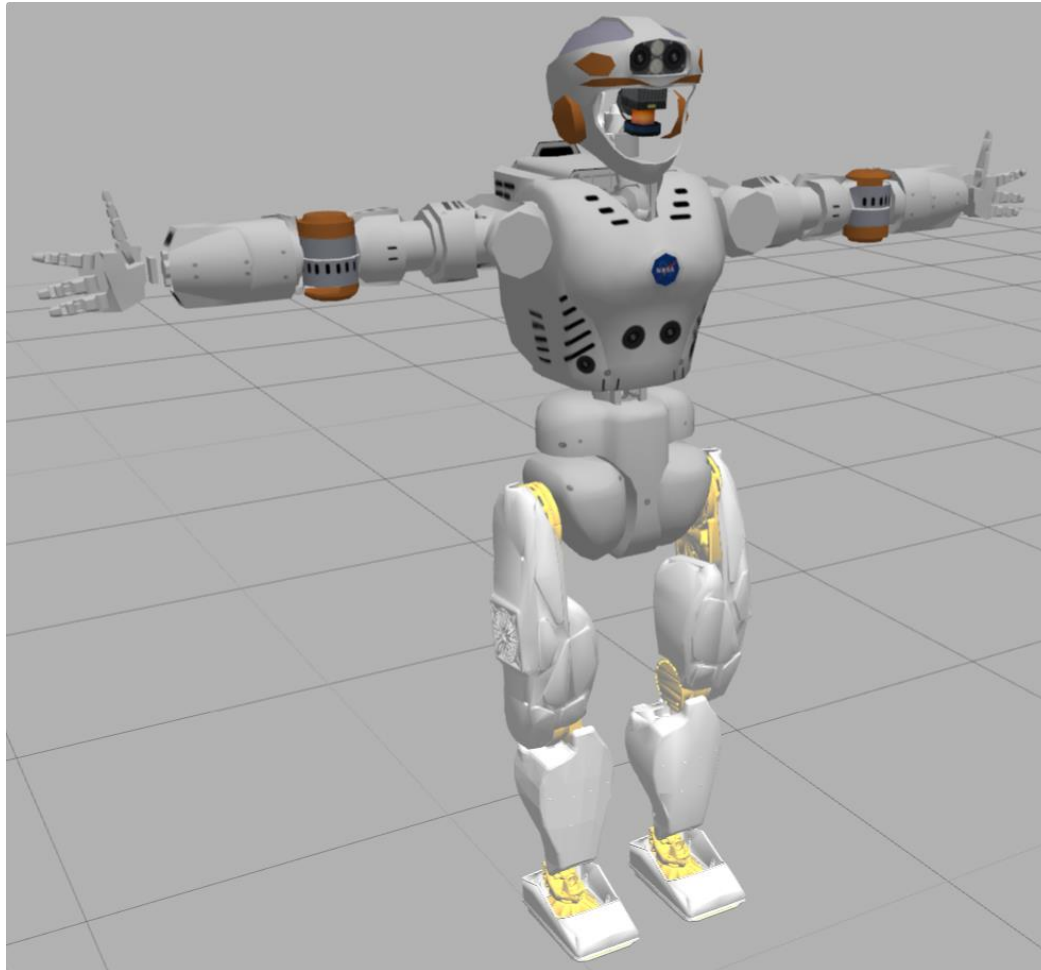
# Valkyrie Simulation

- The following data is part of a kinematic/dynamic simulation of Valkyrie.
  - Visualization Meshes
  - Mass Data
  - Kinematic Data
- No internal component data is included

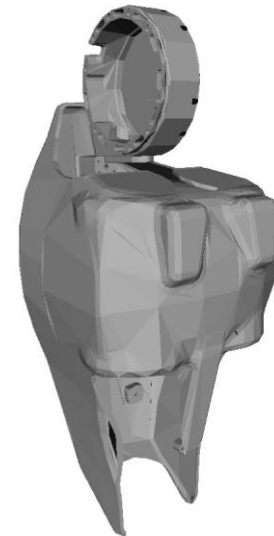
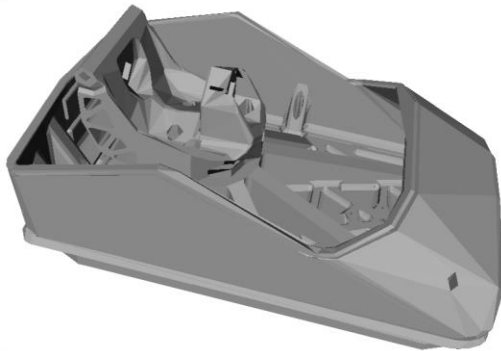
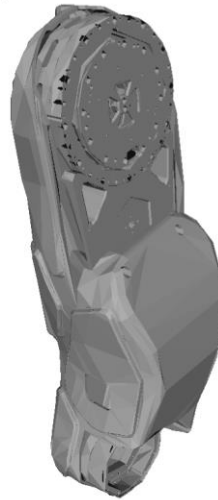
# Visualization Meshes

- The following graphics are pictures of the meshes used for visualization.
  - The meshes only show external features and do not show any internal mechanisms
  - Only surface features are present

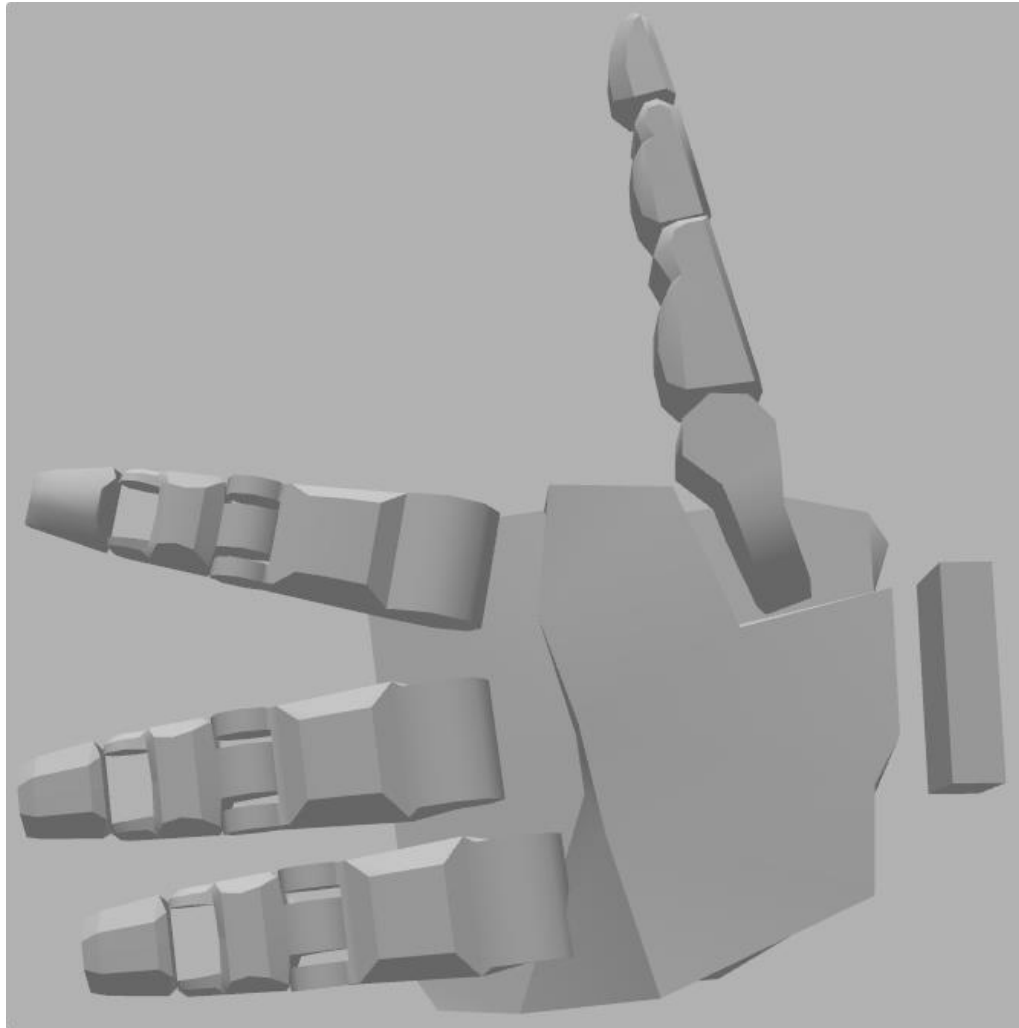
# Visualization provided by the meshes



# Sample of the meshes used for visualization



# Simplified hand and fingers



# Kinematic Data

- The following data is needed to link the joints together in the simulation allowing correct motion of the limbs when receiving commands from a user program
  - Distance between joints
  - Axis of rotation

# Mass Properties

- The following data is needed to run a low fidelity simulation of the robot's dynamics.
  - The data includes link masses, center of mass locations and inertias.

Link Name	Center Of Mass In Joint Frame(m)				Moment of Inertia(kg m <sup>2</sup> )					
	Mass(Kg)	x	y	z	Ixx	Ixy	Ixz	Iyy	Iyz	Izz
<b>Pelvis</b>	8.22	-0.00532	-0.00351	-0.0036	0.118664	-0.00014	0.003271	0.097963	0.00216	0.083855
<b>Torso</b>	39.47	-0.09555	-0.00334	0.243098	0.873269	9.96E-05	0.061345	1.010849	0.001818	0.778398
<b>TorsoYawLink</b>	0.5	0	0	-0.01	0.000608	-1.2E-06	1.65E-06	0.00062	-2.3E-07	0.001078
<b>TorsoPitchLink</b>	0.1	0	0	0.005	3.03E-05	0	-1.1E-06	2.13E-05	0	2.83E-05
<b>LowerNeckPitchLink</b>	1.33	-0.02	0	0.04	0.001471	-0.00013	0.000633	0.001852	0.000243	0.000832
<b>NeckYawLink</b>	1.68	-0.03	-0.01	0.15	0.001998	-0.00018	0.000724	0.00292	0.000246	0.00212
<b>Head</b>	3.89	0.100912	0.005783	0.0347866	0.039848	-0.00047	-0.00283	0.041419	-0.00078	0.036841
<b>RightShoulderPitchLink</b>	2.65	-0.012	-0.251	0	0.013718	0	0	0.010503	0	0.014806
<b>RightShoulderRollLink</b>	3.97	-0.00851	-0.02068	0.00108834	0.009494	-6.7E-05	3.72E-05	0.007681	8.87E-06	0.012455
<b>RightShoulderYawLink</b>	3.085	-0.0043	-0.20983	-0.00729457	0.039355	0.007827	0.000754	0.004906	-0.00272	0.041879
<b>RightElbowPitchLink</b>	1.83	-0.02034	-0.01472	-0.0222999	0.004285	0.000408	-0.00333	0.008441	0.000141	0.007469
<b>RightForearmYawLink</b>	2.476	0.015011	-0.13	0.0195639	0.011755	-0.0013	-0.00073	0.005072	-0.0017	0.011366